

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 2

Amendments to the Claims:

1. (currently amended) A labeled semiconductor material comprising:
~~a surface of a semiconductor material~~ silicon carbide; and
a first metal layer on portions but not all of said surface;
said metal layer forming a pattern with rotational symmetry of C_n , where n is at least 2.

Claims 2-3 (canceled)

4. (currently amended) A labeled semiconductor according to Claim 2 A labeled semiconductor material comprising:
a surface of silicon carbide; and
a first metal layer on portions but not all of said surface;
said metal layer forming a pattern with rotational symmetry of C_n , where n is at least 2;
a second metal layer on portions but not all of said surface of said semiconductor material;
said second metal layer forming a pattern different from said first metal layer pattern;
and
said second pattern having rotational symmetry of C_n , where n is at least 2; and
wherein each of said first and second patterns forms an X pattern.

5. (currently amended) A labeled semiconductor according to Claim 4 A labeled semiconductor material comprising:
a surface of silicon carbide; and
a first metal layer on portions but not all of said surface;
said metal layer forming a pattern with rotational symmetry of C_n , where n is at least 2;

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 3

a second metal layer on portions but not all of said surface of said semiconductor material;

said second metal layer forming a pattern different from said first metal layer pattern;
and

said second pattern having rotational symmetry of C_n where n is at least 2;
wherein each of said first and second patterns forms an X pattern; and
wherein each X pattern further comprises a tab portion perpendicular to at least one of the arms of said X pattern.

Claims 6-9 (canceled)

10. (currently amended) A labeled semiconductor material according to claim 9 1 wherein said metal layer is selected from the group consisting of nickel, titanium, gold, platinum, vanadium, aluminum, alloys thereof and layered combinations thereof.

11. (currently amended) A semiconductor structure comprising:
a substrate having at least one planar face;
a first metal layer on said planar face, and covering some, but not all of said planar face in a first predetermined geometric pattern;
a second metal layer on said planar face, and covering some, but not all of said planar face in a second geometric pattern that is different from said first geometric pattern; and
an epitaxial layer on the opposite side of said substrate from said planar face and said metal layers.

Claims 12-13 (canceled)

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 4

14. (currently amended) A semiconductor structure according to Claim 13 A semiconductor structure comprising:

a substrate having at least one planar face;

a first metal layer on said planar face, and covering some, but not all of said planar face in a first predetermined geometric pattern;

a second metal layer on said planar face, and covering some, but not all of said planar face in a second geometric pattern that is different from said first geometric pattern; and

an epitaxial layer on the opposite side of said substrate from said planar face and said metal layers;

wherein said substrate and said epitaxial layer comprise a semiconductor device.

15. (original) A semiconductor structure according to Claim 14 wherein said device is selected from the group consisting of junction diodes, bipolar transistors, thyristors, MESFETS, JFETS, MOSFETS and photodetectors.

16. (currently amended) A semiconductor structure according to Claim 14 A semiconductor structure comprising:

a substrate having at least one planar face;

a first metal layer on said planar face, and covering some, but not all of said planar face in a first predetermined geometric pattern;

a second metal layer on said planar face, and covering some, but not all of said planar face in a second geometric pattern that is different from said first geometric pattern; and

an epitaxial layer on the opposite side of said substrate from said planar face and said metal layers;

wherein said substrate and said epitaxial layer comprise a semiconductor device; and

wherein said metal layers form an ohmic contact to said device.

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 5

17. (original) A semiconductor structure according to Claim 16 whrcin said substrate and said epitaxial layer are silicon carbide and said metal layers are selected from the group consisting of nickel, titanium, gold, alloys thereof, and layered combinations thereof.

18. (canceled)

19. (original) A semiconductor device according to Claim 14 whrcin said device comprises a light emitting diode or laser diode that includes a p-n junction, and with said ohmic contact comprising a layer of nickel on said substrate and a layer selected from the group consisting of titanium-gold alloys and titanium-platinum-gold alloys on said nickel layer.

20. (currently amended) A semiconductor wafer comprising:
a silicon carbide substrate and at least one silicon carbide epitaxial layer;
respective primary and secondary orthogonal flats;
respective front and back planar faces;
a plurality of devices on said wafer;
each said device having a first metal layer on said planar face, and covering some, but not all of said planar face in a first predetermined geometric pattern;
and
each said device having a second metal layer on said planar face, and covering some, but not all of said planar face in a second geometric pattern that is different from said first geometric pattern.

Claims 21-26 (canceled)

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 6

27. (currently amended) A semiconductor wafer according to Claim 20 wherein:
~~said wafer comprises a silicon carbide substrate and at least one silicon carbide epitaxial layer;~~
said devices comprise light emitting diodes or laser diodes that include a p-n junction;
and
said metal layers comprise a layer of nickel on said substrate and a layer of a titanium-gold alloy on said nickel layer that form respective ohmic contacts to said devices.

28. (Withdrawn) A quality control method for manufacturing a semiconductor device comprising:

placing a first metal layer on a semiconductor face of a device in a first predetermined pattern; and
placing a second metal layer on the same face of the device as the first layer and in a second predetermined geometric pattern that is different from the first pattern.

29. (Withdrawn) A semiconductor manufacturing method according to Claim 28 and further comprising:

inspecting the device to identify the presence or absence of one or both of the patterns on the face.

30. (Withdrawn) A quality control manufacturing method according to Claim 29 and further comprising discarding the device when one or both of the predetermined patterns are absent.

31. (Withdrawn) A quality control manufacturing method according to Claim 29 wherein the step of inspecting the face of the device comprises illuminating the metallized face and scanning the metallized face with a machine inspection system.

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 7

32. (Withdrawn) A quality control method according to Claim 29 wherein the step of inspecting the device comprises inspecting a transparent device by illuminating the face opposite from the metal layers and scanning the opposite face with a machine inspection system.

33. (Withdrawn) A quality control method according to Claim 29 wherein:
the step of placing the metal layers comprises placing a pattern with rotational symmetry of C_n , where n is at least 2; and

the step of inspecting each device comprises inspecting either face of the device to identify the presence or absence of the C_n pattern.

34. (Withdrawn) A quality control method for manufacturing wafers with a plurality of semiconductor devices thereon, the method comprising:

placing a first metal layer in a first predetermined geometric pattern on a semiconductor face of each device; and

placing a second metal layer on the same face of each device as said first layer and in a second predetermined geometric pattern that is different from said first geometric pattern;

inspecting the face of each device to identify the presence or absence of one or both of the patterns on each device; and

discarding the devices for which one or both of the patterns are absent.

35. (Withdrawn) A quality control method according to Claim 8 wherein the step of inspecting the face of each device comprises evaluating each device with a machine inspection system.

36. (Withdrawn) A quality control method according to Claim 34 wherein:
the step of placing the metal layers comprises placing a pattern with rotational symmetry of C_n , where n is at least 2; and

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 8

the step of inspecting each device comprises inspecting either face of the device to identify the presence or absence of the C_n pattern.

37. (Withdrawn) A quality control method according to Claim 34 comprising forming the semiconductor devices on the wafer prior to the step of placing the first metal layer on the devices.

38. (Withdrawn) A quality control method according to Claim 37 wherein the step of forming the semiconductor devices comprises forming at least one epitaxial layer on a substrate wafer.

39. (Withdrawn) A quality control method according to Claim 38 comprising forming an epitaxial layer of silicon carbide on a silicon carbide substrate.

40. (Withdrawn) A quality control method according to Claim 39 comprising placing the metal layers on the face of the substrate opposite the epitaxial layer.

41. (Withdrawn) A quality control method according to Claim 34 comprising:
placing the metal layers on a wafer that includes at least one flat; and
aligning the metal layers with the flat in a predetermined relationship.

42. (Withdrawn) A quality control method according to Claim 41 wherein the step of inspecting the devices comprises aligning the flat of the wafer with a machine inspection system and thereafter evaluating each device with the machine inspection system.

43. (Withdrawn) A quality control method according to Claim 35 wherein the step of inspecting the devices comprises inspecting a transparent device by illuminating the face of

Tuttle, et al.
Ser. No. 10/045,766
Filed: 10/23/2001
Page 9

the wafer opposite from the metal layers and scanning the illuminated face with a machine inspection system.